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Too CAS or not too CAS!

This technology has been used in the mathematics classroom for at least 12 yrs.

Mathematicians have always been at the forefront of technological advances. It was the code breakers at Bletchley Park who invented one of the first computers, and Leibniz (co-founder of The Calculus) invented a calculating machine in the early 17 hundreds. Spread sheeting on a COMPUTER has long been a component of the secondary mathematics curriculum. Mathematics has made the best use of all available technologies since the development of Log tables. Mathematicians have been the drivers of technology because it has never been about the mechanics of solving problems but rather about the formation of the problem in the language of mathematics.

Some days I feel like a Calculator technician – righting wrongs, fixing calculators, copying files and installing new operating systems. We became involved in the pilot in main because of concerns we had regarding the introduction of CAS technology into the mathematics classroom. Our two main concerns were equity and pedagogy.

Perhaps the introduction of a comprehensive pilot scheme could be interpreted as an admission from the ministry that the graphics calculator has impacted on mathematics education in ways they had not been foreseen. The pilot scheme should therefore be seen as a appropriate response to the inevitable impact of CAS technologies on the teaching of mathematics.

And yet some teachers are stuck out on the street wearing sandwich boards warning of the dangers of a flat earth. I must be the high priest, poised at the alter, ClassPad sharpened, ready, to sacrifice the concepts, beauty of the subject, and practice of mathematics.

As a teacher who has been involved in the project since the beginning of 2004 I would like it put on record that I am not struggling with the pedagogical issues surrounding the use of these calculators. Given appropriate thought and care it is possible to introduce a pedagogy that enhances the conceptual understanding of mathematics.

Any teacher who has had Asian pupils in their room will testify to their blind competence in algebra and arithmetic. Where they sacrifice their understanding on the alter of ROTE learning.

My students develop a global understanding of mathematics without artificially dividing it up into discrete units. Conceptually they understand algebra; where it comes from, how it can be used and most importantly, how to use it. After nearly two years without explicitly teaching the “fundamental skills” my students were able to master these in a matter of a week because they understood how algebra worked at a conceptual level. I was sold they day my year 9 students were able to recognise and form an exponential number pattern through self exploration on the ClassPad.

We have to ask and answer the important questions. What are the fundamental skills of mathematics? What do we expect our secondary school mathematicians to be able to do with mathematics?

University mathematics departments are of course wrestling with the same issues. However at some universities the technology has been embraced through computer based

mathematics courses since the early 1990’s. These departments are currently engaged in dialogue both internally and externally as to the role graphics calculators should have in their intermediate courses. They are awake to the reality of the situation and know that assessments must change to reflect the increased ease and speed of mechanical calculations. These assessments will test candidates understanding of mathematics rather than their ability to blindly reproduce the rules.

What does a mathematician do? He or she tries to describe reality in the language of mathematics. A mathematician is not a factoriser nor an expander, her or she is an explorer, searching for links and patterns in reality. Maybe to be used to develop new technologies or to solve previously unsolvable problems, but more likely for the pure pleasure and joy of doing mathematics.

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